

Application No. 09/396,266
Docket No. 1998U007A.US
Reply to Office Action Dated May 15, 2003

Remarks

New Claims

The undersigned wishes to thank the Examiner for a very courteous and helpful interview with Mr. Kurtzman that took place on November 7, 2003. Inadvertently this supplemental amendment, which was discussed during the interview, was not promptly mailed. The undersigned now believes this response is fully responsive to the prior office action. The claims as amended do not contain the ligand (JY). Nevertheless, 37 CFR 1.111 allows the Applicant to amend the claims. The Examiner holds that the metallocenes are different from the ones previously examined. Nevertheless, 37 CFR 1.111 allows amendments so long as the claims are fully supported in the specification. The undersigned has now amended the claims and presented arguments pointing out the specific distinctions believed to render the claims patentable over the applied references. It is truly believed this amendment constitutes a *bona fide* attempt to advance the prosecution of this specification.

Claims 33 – 42 are before the Examiner. Claims 33, 34, 38, 40 and 42 have been amended. Claims 34 – 37 and 39 – 42 were previously presented. The new claims find support in the specification at page 6, fifth line from the bottom; page 7, line 5; page 15, the formula in the middle of the page and the structural formulas thereafter; page 16 the last line; page 23; and the examples in the specification.

Section 103 Rejections

Previous claims 1-3, 5, 7-11, 14-20, 22, 24-28 and 31-32 (now claims 33-42) have been rejected under 35 U.S.C. 103(a) as being unpatentable over *Machida et al.* ('577) and *Nakanaga et al.* ('622). This rejection is respectfully traversed.

Machida et al. in essence disclose literally thousands of metallocenes, including mono cycloalkadienyl, monocycloalkadienyl -hetero atom, and bis(cycloalkadienyl) metallocenes employing both alumoxanes and the ionic activators. It should be readily recognized by the Examiner that the Patentees make no distinction amongst the literally thousand of choices of metallocenes. It should also be noted that *Machida et al.* are primarily looking to obtain macromers. The macromers are then employed as a comonomer with olefins to form branched

Application No. 09/396,266
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polyolefins. No example in *Machida et al.* employs the catalyst systems in accordance with the instant claims. In fact, *Machida et al.* include monocyclopentadienyls that are specifically excluded from the instant application. For example *Machida et al.* example 1 employ pentamethylcyclopentadienyltitanium trimethoxide, example 2 employ a metallocene and triisobutyl aluminum, example 4 employ a bis(cycloalkadienyl)metallocene, and example 5 employ pentamethylcyclopentadienyltitanium tributoxide. The remaining examples also employ catalyst systems outside the scope of the instant claims.

Not only are the catalyst systems of *Machida et al.* outside the scope of Applicant's, but also when one compares the activities obtained by *Machida et al.* the unexpected results of the instant invention becomes completely clear. The activities of *Machida et al.* were calculated in units that are employed in Applicant's claims. In Example 1 of *Machida et al.*, employing pentamethylcyclopentadienyltitanium trimethoxide, the activity was 1.2 g/(mmol h). The examples in the instant application obtain activities that are 50,000 to 1 million or more over that of *Machida et al.* *Machida et al.* example 2, employing aluminum triisobutyl obtains a macromer and the activity is 740 g/(mmol h). Example 5 demonstrates an activity of 495 g/(mmol h). It is therefore urged the *Machida et al.* activities are so low that the ordinary practitioner in the art would avoid the use of mono Cps altogether. Such low activities would not at all be economically useful. Applicant on the other hand has unexpectedly discovered that certain mono Cps within the scope of the instant claims can be usefully employed for the polymerization of olefins to polymers (not macromers as shown in *Machida et al.*). It is therefore respectfully submitted that the instant claims are unobvious in the sense of 35 U.S.C. 103 over *Machida et al.* Withdrawal of the rejection over *Machida et al.* is respectfully asked.

Nakanaga et al. do not disclose any activator that is a neutral or ionic ionizing salt comprising a cation selected from the group consisting of triphenylcarbenium, dimethylanilinium, and trialkylammonium, and an anion selected from the group consisting of borate and aluminate (non coordinating anions). At page 4, lines 19 and 20 *Nakanaga et al.* state that the "activity per unit transition metal was still inadequate." Such a statement combined with the activities demonstrated by *Machida et al.* is deemed to be proof of the unobviousness of Applicant's claimed invention. In view of the absence of any activators as recited in the instant

Application No. 09/396,266
Docket No. 1998U007A.US
Reply to Office Action Dated May 15, 2003

claims and a teaching away from that which is instantly claimed it is respectfully submitted that *Nakanaga et al.* fail as a reference under 35 U.S.C. 103. Withdrawal of the rejection over *Nakanaga et al.* is respectfully asked.

A review of the examples in the instant application demonstrates the unexpected results. Table 1 shows the very high activity. Each of the metallocene in these examples satisfy the formula as now appearing in the amended claims. In Table 2, excellent results are shown for the examples within the scope of the claims as compared to the comparative examples. Note that *Machida et al.* do not distinguish between the borates and alumoxane as cocatalysts. Furthermore, as shown in our Table 2, catalyst like methylcyclopentadienylZrbenzyl in combination with alumoxane are not very active while the catalyst within the scope of the instant claims in combination with boranes obtain very poor activity and in fact two of the examples obtained zero activity. Please note that when comparing example 6 and 7 in this application the lower activity of example 7 would be understood because of the activator to catalyst ratio.

Previous claims 1-3, 5, 7-11, 14-20, 22, 24-28 and 31-32 (now claims 33-42) have been rejected under 35 U.S.C. 103(a) as being unpatentable over *Campbell et al.* in view of *Nomura et al.* and *Pellechia et al.* This rejection is respectfully traversed. As in *Machida et al.*, *Campbell et al.* present thousands of possibilities for the metallocene. Furthermore the Patentees teach that the catalyst system is useful for the polymerization of vinyl aromatic monomers. It should be noted that in the *Campbell et al.* examples the catalyst systems are outside the scope of that instantly claimed. Not only are they out side the scope of that instantly claimed, but also by examples in Applicant's application it has been demonstrated that those systems are not operative for the polymerization of olefins. In each of the *Campbell et al.* examples the patentees employ a borane and TIBL. At most therefore, *Campbell et al.* have shown that such borane catalyst may be operative for the polymerization of styrene. Applicant, on the other hand has shown in Examples 9 and 10 that the boranes do not provide for a viable catalyst system for olefins. There is no teaching or suggestion to the ordinary practitioner in the art that the instantly claimed catalyst system comprising the certain mono Cps in combination with a non-coordinating anion could be usefully employed for the polymerization of olefins. It is further submitted that *Pellechia et al.* do not help *Campbell et al.* for a selection of catalysts that would

Application No. 09/396,266
Docket No. 1998U007A.US
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be useful for the polymerization of olefins. *Pellechia et al.* unequivocally provides a strong implication that their use is rather limited. As one of ordinary skill in the art can readily recognize, the activities shown in Table 1 are low as compared with the activities found in accordance with Applicant's invention. Furthermore in some of the polymerizations *Pellechia et al.* merely obtain oligomers or waxy materials. Applicant, nevertheless discovered that the certain substituted mono Cps as recited in the instant claims do in fact provided a stable, novel and unobvious catalyst system that can be employed for the polymerization of olefins accompanied unexpectedly by a high polymerization activity. *Nomura et al.* also do not help *Campbell et al.* with respect to the instant claims since they do not disclose any non-coordinating anions. Withdrawal of the rejection is respectfully asked.

In view of the above new claims and remarks it is respectfully submitted that all the claims in this case are allowable. Prompt notice of allowance is respectfully solicited. The Applicant invites the Examiner to telephone the undersigned attorney if there are any other issues outstanding which have not been presented to the Examiner's satisfaction.

The Commissioner is hereby authorized to charge any additional fees which may be required by this paper, or credit any overpayment, to Deposit Account Number 50-0589.

Respectfully submitted,



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